RESEARCH GROUP

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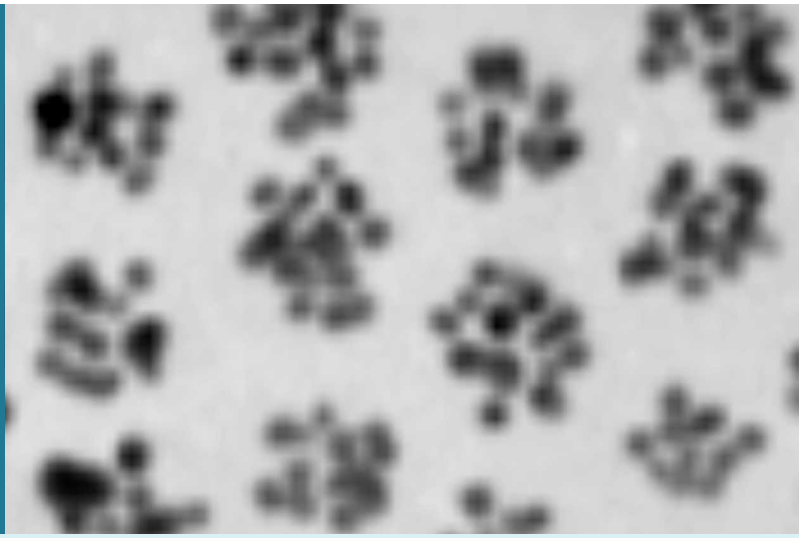
Nano-enabled Medecine and Cosmetics



The latest advances in nanotechnology have indeed pointed to significant promise of engineering at the nanoscale to evolve material/surface properties to meet the demanding specifications of clinical end users. However, the ability to create and modify structures, control their response and investigate the structural and functional attributes at molecular level poses significant scientific challenges to date. To ensure such solutions are technologically viable imposes critical quality assurance demands, viz. high stability, low variability, excellent scalability and low cost.

Our research challenges

We design and develop nanostructured materials and interfaces to deliver key enabling technologies and thus successfully interrogate and influence events of biological relevance, at dimensions down to molecular level. These include interfaces engineered for high-performance in biomedical sensing, imaging and therapy. We perform this in partnership with clinical and industry end-users, to deliver successful technology solutions that effectively meets clinical specifications adopting materials and processes that are readily transferrable to industry.

Our competencies

We have demonstrated, and continue to develop strong capabilities in nanofabrication, processing, surface chemical/biochemical functionalization of optical and electrochemical interfaces for sensing and drug-delivery formulations exercising control down to molecular level using technologies that are scalable (full wafers, with development aiming at larger substrates with continuous flow processing), with quality assurance that closely meets the application demands for stability under different solutions, and scalability.

Application areas

In Vitro sensors

- *In vitro* models for rational design of therapy
- Nanoscale sensors for high-throughput screening platforms
- *In vitro* diagnostics for personalized medicine

in Vivo sensing, imaging and therapy

- Theranostic nanoparticle vectors with (multi-)imaging to guide surgery and targeted drug delivery, including delivery of multiple drugs
- Targeted therapeutic stimuli using tissue-tolerable plasmas combined with engineered nanocarriers
- Theranostic devices (patches with sensing, drug delivery, or both)

Regenerative interfaces

- Micro/nanostructures in 2D/3D to engineer cues for endogenous regeneration
- Modelling factors for endogenous regenaration through *in vitro* models

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